Looking Back: Moving Forward

Defining moments in building Georgia's biotech prominence

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Thank you for the introduction Russell / pleasure to be with you today.

The great new wave philosopher David Byrne (of the Talking Heads) wrote a very good coming of age song (Once in a Lifetime) in the early '80's. You might remember one of the lines. "And you may ask yourself, well … how did I get here?"

I'm not asking that question of myself this morning … but it's a question we might all ask about our industry.

How did we get here?

It's a question that helps us take stock of where we've been … so that we can appreciate where we are today, and where we can go tomorrow.

Kevin helped us consider the larger context of biotech in our nation and world – where it is, and where it's going. That helps us put Georgia in perspective. But as we look at our state, we see a question mark.

Even the title of today's gathering is framed as a question: *Georgia as a biotechnology capital?*

I think the majority of us here today would agree that Georgia hasn't fully arrived as a biotech capital.

But I believe we're well on the road to greater status, and more important, we're heading in the right direction. That's a lot more than many states can claim.

This morning, I'll talk about why I think that … and what it will take for us to reach our destination.

A good place to start is right here, right now. Georgia has a very strong foundation in biotechnology to build on.

- We're **ranked no. 14** in bio-related occupations (source: EMSI)
- We're in the top quartile **in the number of biotech companies**. Fifteen years ago, Georgia *wasn't even ranked*
- A recent report from the Biotech Industry Organization shows Georgia's biotech industry **employing over 27-thousand people** across more than **17-hundred establishments** at an average wage of **$78 thousand**
- And we are growing. An analysis of announcements from companies in the past five years showed that **2,400 new jobs were created in the industry** – and that number is just from reading news releases
- We have the nation's **no. 2 degree program in biomedical engineering** – which is a joint effort between Georgia Tech and Emory
- We have the **largest and most comprehensive academic vaccine research center in the world,** the Emory Vaccine Center
- We have the most **pre-eminent research enterprise in complex carbohydrate research**, at the University of Georgia
- We have a solid **critical mass of biotech and life science companies**, including big brand names like Baxalta and Merial
- …not to mention **robust employment in the sciences** at our universities
- And of course, we're home to the Centers for Disease Control and Prevention, as well as the world's number one nonprofit focused on eliminating cancer as a major health problem, The American Cancer Society

So: I'll take the position that we have what it takes.

We have all of the pieces here that are needed for a thriving biotech presence.

- We have **phenomenal capacity to invent and discover** new therapies, treatments, and technologies.
- We can **evaluate and test what's been invented** – through companies, hospitals, and other healthcare organizations.

- We're **able to get new companies off the ground**, providing some capital and expertise.
- We have a capable workforce and we make a **strong case to attract established companies** to our state and help them grow.
- And best of all, we have ***activity*** – we're actively building on all of these areas, rather than stagnating or retreating – and that's very important.

When you look at all these pieces together, you see a strong foundation. The question is, what are we going to do with it?

How do we erase that question mark from the phrase, "Georgia as a biotech capital?" – and maybe even punctuate it with an exclamation point!

To envision tomorrow, we should take a close look at how we arrived at today. The past 30 years or so have brought a series of decisions and developments that turned out to be pivotal in building our current infrastructure in biotech.
These are more than good campfire stories; they represent lessons we should pay attention to as we plan and take our next steps as a state.

The first one of these actually pre-dates all of the others by a good 40 years or so … to a period just after World War II. In 1946, a Public Health Service program called Malaria Control in War Areas changed its name and broadened its mission – and the Communicable Disease Center was born. CDC took offices on a single floor in the Volunteer Building downtown on Peachtree Street. The move to offices downtown was significant – 400 CDC employees would go to work every day - not in Washington, D.C., but in our city.

A year later, Robert Woodruff – then chairman of Coca-Cola and a member of Emory's Board of Trustees – quietly encouraged Emory to donate 15 acres of land for a CDC campus. The question is, why did he make this recommendation? Some believe that the idea came from Dr. Glenville Giddings, who at the time was the medical advisor to Coca-Cola.

Dr. Giddings had organized teams to conduct malaria surveys in the preceding years, so he had an up-close look at the Federal government's work in this area. Interestingly, Dr. Giddings was the son-in-law of Preston Arkwright, president of the Georgia Power Company. Georgia Power was, of course, concerned about malaria wherever a stream was dammed and a lake created for the production of power.

And Woodruff had become interested in malaria when he found the disease widespread at Ichuaway Plantation, his hunting preserve in South Georgia.

So Woodruff got Emory to donate this land – only, they technically didn't donate it. The university charged the federal government $10 for the purchase.

A number of CDC employees each contributed a dime to pick up the tab. It was a gesture that signified the beginning of a strong relationship between CDC and Atlanta and Emory.

The next year, the U.S. Surgeon General came to Georgia to accept the property presented by Emory. He promised that "the world's greatest center of communicable disease research and control would be built." It would be, quote, "a health institution of real credit and service to the nation."

That would take some time. During the Truman administration, a budget freeze prevented new construction. A few years into the Eisenhower administration, the vice president of Emory, Boisfeuilet Jones, called the CDC chief and asked why no buildings had been constructed on the land. Dr. Bauer said: We still can't get anything approved through the Bureau of Budget.

Enter Robert Woodruff again. He called President Eisenhower, who had often hunted at Woodruff's Ichuaway Plantation. They were friends.

As the story goes: The president was golfing when he took Woodruff's call, and Woodruff asked him if he had a pencil and paper handy. Then he asked: Why hadn't the government built a central building for CDC at Emory?

President Eisenhower said, quote, "Send me a note." Woodruff replied, "I'm not sending you a note. I asked if you had a pencil and paper." The next year, an appropriation was in hand, and construction followed.

What if Woodruff hadn't listened to Dr. Giddings? What if he hadn't been persistent – and had not taken the time to call the president? We might not have the CDC we have today – or even have it all in Georgia.

Of course, CDC is not a purely biotech organization. It evolved into our nation's public health agency. There is no disputing that it is the premier science and health organization in the world. And its headquarters in Georgia gives our state name recognition and credibility. It also serves as a magnet for attracting other scientists and building collaboration in a number of health areas.

That was a defining moment in Georgia's bioscience past. Now, fast-forward to the 1980s and 1990s. In here was a 10-year period that brought not one, but three big developments in university-related biotech research for Georgia. All three of these continue to pay big dividends for our state.

The first of these surfaced from a moment of serendipity in 1984. The University of Georgia's head of plant biology, Joe Key, was on sabbatical in Boulder, Colorado – working for a company called Agrigenetics.

Joe was having brunch with Alan Darvill and Peter Albersheim, both at the University of Colorado, who together had a large research team in the science of carbohydrates.

Alan and Peter related that they wanted to grow the program at the university. But they weren't happy with the pace of progress. They felt stuck, and so they had decided to look for a new scientific home. On their list was Cornell in New York and Scripps in California. But Joe told them to consider Athens, Georgia, and UGA.

So Alan and Peter visited Georgia, where they met with several people, including Tom Cousins, the real estate developer and UGA alum who was a champion of the university.

A side note here about Tom Cousins. Years earlier, in the early '70s, Tom was on the board of Rockefeller University where he first was introduced to the concept of federally-funded research. He saw the hundreds of people that the university employed because of major research grants – and the potential billions of dollars that could stem from the commercial application of their work.

"They're *grants,"* he told someone, "not loans. You get to keep what you discover. How do you lose on something like that? It's better than Santa Claus."

But Cousins came to ask: Why isn't more of this happening in Georgia? So when the opportunity emerged to help UGA recruit Alan Darvill, Peter Albersheim and their team, Cousins was all-in. And so was President Fred Davison. They worked together to secure funding from the Georgia General Assembly. And before you knew it, the Colorado research team was moving into temporary space at UGA.

The university also came up with a creative milestone for this new carbohydrate research group: When they reached certain levels in attracting research grants, the university would commit to adding more faculty to the team.

Early on in the center's history, the Georgia Research Alliance made some key investments as well. One of these was a 900-Megahertz NMR spectrometer. Back then, it was one of only a handful of machines of comparable power in the world. Even now, only 50 or so of these super-powered instruments are in operation.

Today, it's not an exaggeration to say that UGA's Complex Carbohydrate Research Center is regarded as the leading center of its kind in the world. That's really significant because there is no human disease that doesn't involve carbohydrates. And given that most drugs are designed to attach to proteins in the body, it's important for scientists to understand the structure of proteins and how they interact with other molecules.

CCRC has nearly 300 scientists and researchers. It's attracted nearly a quarter-billion dollars in research grants. And scientists from around the world frequently show up at the doors on Riverbend Road in Athens to consult with the center's researchers and to use its technology.

All of this began in the early 1980s. And it was around this time that something else happened that led to the *second* of the three major developments involving our universities. It was a loss that eventually became a win.

In 1983, Georgia was working hard to recruit a major company, the Microelectronics Computer and Technology Corporation. But it wasn't to be: The company chose to move to Austin, Texas instead. A major reason they cited was the strong partnership among the universities in Texas, and among business and academia.

Georgia had talked about its inter-university cooperation, too. But in the words of Jim Balloun, who headed McKinsey's office here during the bid to land MCC, Georgia's case was, quote, "really just a brochure." The truth was, the presidents of Georgia Tech and UGA couldn't even be in the same room with each other. The universities' rivalry on the football field had spread to something much bigger and deeper.

Stung by the loss of this great technology company, Gov. Joe Frank Harris named a group of CEOs to study how Georgia could prevent similar losses in the future. The head of the CDC even joined the effort. In 1985, the study group – called the Georgia Research Consortium Advisory Committee – recommended that the state create an organization to lead technology and economic development efforts.

Here, Tom Cousins comes back into the picture. Remember, this was in the mid-1980s. The Jan Kemp controversy at UGA led to the resignation of President Fred Davison. A short time later, the president of Georgia Tech, Joe Pettit, died while in office.

So you've got both universities searching for new leaders – and a chance to build bridges rather than extend rivalries.

Cousins chaired the search committee at UGA … and Larry Gellerstedt, Jr. chaired the search committee at Georgia Tech. Both were also at the center of forming this Georgia Research Alliance – and you know that Cousins was a believer in the economic development potential of research. And in fact, Gellerstedt had already chaired the study group appointed by Governor Harris.

In 1987, the president of Georgia State University, Noah Langdale, announced his retirement after 30 years. So we now add Dan Sweat, the longtime Atlanta civic leader and head of Central Atlanta Progress, into the mix.

The work of these three business and civic leaders, plus an in-depth study by McKinsey, led to the launch of the Georgia Research Alliance in 1990.

Most efforts to attract research in the country were like "Field of Dreams" – *build it and they will come.* Clear some dirt, build a building, and the science and the program will follow.

GRA took a very different approach. It was: *Build around talent.* Just as UGA brought the Colorado carbohydrate scientists to Athens, GRA would help universities do the same. This led to the creation of the GRA Eminent Scholars program.

I'd like to spend the next hour guiding you through GRA's 25-year journey, but I won't. What's important to know is this: *The strategy worked.*

Today, the Georgia Research Alliance is a model that other states have rushed to copy. We have 63 Eminent Scholars at the state's research universities, all of whom occupy endowed chairs. We've made millions of dollars of strategic investments in technology – like the NMR spectrometer at UGA – that have helped land billions in research grants.

GRA has also helped shape projects and seed companies launched out of the labs – and just last month, those new enterprises reach the $1 billion mark in attracting outside investment capital.

Think about that: a billion dollars in venture capital generated by GRA-supported startups alone.

GRA's three-pronged work – attracting talent … investing in technology … and seeding companies – is reflected in the *third* university development that has helped build a strong biotech foundation for Georgia. This story also dates back to the early 1980s, at The Scripps Research Institute in La Jolla, California.

It was here that a scientist named Richard Compans worked alongside another scientist named Rafi Ahmed. The two didn't know each other very well. Rafi tended to start his workday in the afternoons and go into the night. But Richard Compans remembers being impressed with this young immunologist from Hyderabad, India. He found Rafi Ahmed both prolific and productive.

Compans left Scripps and eventually went on to chair the microbiology and immunology department at Emory. Ahmed left later for UCLA. But they stay connected – both worked together on an NIH study section for three years, reviewing grant proposals and helping to shape the agency's research agenda in immunology.

For a couple of days, several times a year, their study group would meet in Bethesda, Maryland, often reviewing proposals well into the night. This was probably just fine for Rafi – he is a night owl.

In the early 90s, shortly after he joined Emory, Compans was contacted by colleagues at GSU and UGA about coming up with something big in biotech that GRA could get behind. He thought it would be a good idea for Emory to pursue a research center on vaccines. He knew vaccinology was a major research interest at NIH at the time … and looking over the horizon of the next few years, Richard Compans saw opportunity. The problem was, Compans didn't have the budget to attract a world-class faculty member or build a center, so it made sense to get GRA involved.

GRA responded with a $10 million commitment to help recruit a leading researcher and build out space to start the center. And, of course, Richard Compans called Rafi Ahmed to invite him to Georgia. At the time, Ahmed had just demonstrated that T-cells were capable of remembering antigens that had been fully purged from the system of their hosts. It was a discovery that had made him a superstar in immunology research.

You know the rest of the story: Ahmed came to Georgia, and the Emory Vaccine Center was built. As I mentioned a moment ago, it's the largest university-based vaccine research enterprise in the world: 280 scientists, including five GRA Eminent Scholars, and nearly $80 million in outside research funding.

Rafi Ahmed was employee number one. Another early recruit was Harriet Robinson, a principal scientist at the Worcester Foundation for Experimental Biology who was becoming an expert in HIV vaccine research. Harriet needed access to nonhuman primates for her research, so she decided to leave Massachusetts and head to Emory University and Yerkes.

The progress that Harriett and her colleagues made in the years that followed – and the promise of vaccine candidates for HIV – led to the launch of a company in 2006, GeoVax. GRA provided early-stage funding, and today, the company has four HIV/AIDS vaccines in its pipeline – including one that is starting Phase B efficacy trials – as well as vaccine candidates for Ebola and Zika virus.

Recruiting talent … investing in technology infrastructure … seeding a promising startup … this is how GRA works.

The Complex Carbohydrate Center, the Emory Vaccine Center, the founding of GRA itself – all show how much our state's universities contribute to the foundation of biotech in Georgia today. The case can be made that university research and development has had more to do with the development of the biotech industry than any other factor – here in Georgia and nationally.

One reason is that, starting in the 80s, a lot of biotech startup companies were born out of the labs in universities. In Georgia, these startups got our community talking about and focused on the potential of biotech. *They proved that biotech could be done here in Georgia.*

There was **Hybridoma Sciences**, a spinout from CDC and Emory in 1981. Hybridoma was a true pioneer – it was one of the very first companies to commercialize monoclonal antibodies.

And **Theragenics**, one of the earliest medical device companies in Georgia. Launched by Georgia Tech professor John Russell, Theragenics incubated at Georgia Tech, which (some of you may recall) once had a small nuclear reactor. They used the reactor to irradiate seeds that could be implanted to treat prostate cancer. The treatment was called TheraSeed.

There was **CryoLife**, the tissue engineering company that practically pre-dated the term "tissue engineering." CryoLife was the first to use ultra-low temperatures to preserve human heart valves that were needed in complex cardiac reconstruction surgeries.

Bob McNally, now with GeoVax, co-founded CryoLife in 1984 – it was one of the three Georgia-based biotech companies he founded.

When we think of those early days, we also think of **CytRx,** the biopharma company. In the mid-80s, Dr. Robert Hunter at Emory and Dr. William Ragland at UGA were studying vaccine adjuvants. Hunter started the company after venture capitalist Steve Gorlin took interest in the scientists' work.

Looking back, we see just how valuable CytRx was. The research it supported at Emory led to multiple NIH grants and collaborations with CDC and others. The thesis projects of at least eight Ph.D. students were derived from CytRx technologies.

This kind of public-private collaboration around translational science was ahead of its time.

There was **Sealite Sciences**, too. Anybody here remember Sealite? Milton Cormier, a biochemist at UGA, developed the basis for the luminescent protein technologies that were later used in the diagnostics test kits marketed by Sealite. Lee Herron, who now heads up commercialization for GRA, was the CEO of this company in its second iteration. Sealite went on to be acquired.

I was working at the ATDC at Georgia Tech when another of these early companies, **Biomedical Design**, came along in 1988. It was launched by Jean Marie and Nadia Giradot. Biomedical Design was the first to develop a way to keep calcium from building up on heart valve implants.

Biomedical Design was the *very first biotech company* to occupy the ATDC … and it was kind of a wake-up call for us. I can tell you that Jean Marie and Nadia caused us to rethink and re-engineer what would be required to support fledgling biotech companies. We knew how to outfit space for companies developing software or electronic devices. But they wanted a chemical fumehood. And they would not take 'no' for an answer, which is to their great credit. We got it done. Today ATDC has an entire facility tailored to the unique needs of incubating biotech firms. And so does UGA, Augusta University and Georgia State University.

These are just a few examples from that period of time.

It's worth noting that these companies *ascended* rather than *descended.*

They rose out of research, much of it in our university labs, rather than being spun off from larger ancestors.

There are no big companies that created the lineage for the biotech industry in the same way that such companies did in electronics and technology in Georgia. Scientific Atlanta not only brought us the TV cable box – it spawned other companies and products in cable TV.

Similarly, Hayes Microcomputer Products gave rise to computer modem technology and helped create a whole new industry.

Name a technology company in Georgia today, and you can trace the lineage. You'll see the branches that lead back to Scientific Atlanta, Hayes Microcomputer, or MSA, an Atlanta-based software giant in the 80's and 90's

But on the biotech and bioscience side, no such family tree exists. It's a Charlie Brown tree. We love it, of course. But unlike the tech side, ours has been a very bottom-up industry.

Hybridoma, Theragenics, CryoLife, CytRx, Sealite, Biomedical Design – these are the pioneers of biotech in Georgia. There was very limited infrastructure here to help them launch.

No GRA, no Georgia Bio, no angel network, no early stage funding. They forged a path for others that would follow with names like AtheroGenics, Inhibitex, GeoVax, Altea, Sciele … and today, companies like Celtaxsys, Clearside Biomedical, Accutis, Viamune, Que Oncology and Axion Biosystems.

I want to mention two other developments that helped give us a strong foundation for biotech here in Georgia. Both are evolutionary in nature.

They show how a good idea changed over time … and eventually delivered something that we couldn't do without today.

The first one traces back to a newspaper headline in 1987 … when The American Cancer Society announced it would leave its Manhattan home of 75 years and move to Atlanta.

ACS built its headquarters on Clifton Road. So now you have Emory University, Emory Healthcare, CDC, and the world's pre-eminent cancer-fighting organization all aligned in a single geographic area.

The economic development folks at DeKalb Chamber of Commerce recognized that this alignment offered a competitive advantage. And they sought to leverage this advantage by developing a biotech corridor – the "Clifton Corridor" – that would serve as a focal point in the Atlanta region for health and life science.

This effort gave rise to the Clifton Corridor Biomedical Research Council, the first organized effort in Georgia to use geography as a way of marketing around a health/science concept. The Woodruff Foundation provided early funding, as did Tom Cousins' Family Foundation, as did Georgia Power. Those three names keep coming up. They are kind of our trifecta.

While noteworthy, the value and significance of the Clifton Corridor group would end up reaching beyond this stretch of road in DeKalb County.

That's because the Council evolved into the Georgia Biomedical Partnership, which we all know today as Georgia Bio. This industry organization, now led by Russell Allen, serves as the "voice of Georgia's bio-economy."

And its roots run all the way back to that American Cancer Society announcement nearly 30 years ago.

Speaking of cancer: the second other development traces back to a chance conversation in 1999. This conversation gave us one of the most important legacies we have today in the life sciences: A major network of cancer clinical trials.

The setting was a Christmas party, where Hamilton Jordan, the former White House Chief of Staff, ran into Dr. Michael Johns at Emory's Woodruff Health Sciences Center.

Jordan was a three-time cancer survivor. He told Johns quote, "we need to do something about cancer in Georgia. Our state is lagging in so many cancer care categories. We have no NCI designated cancer center. Information on clinical trials is inaccessible." His list of shortcomings was long.

Georgia had the pieces in place – national organizations and agencies, great research universities, millions of dollars coming from the U.S. tobacco settlement. But these pieces weren't tied together in a unified way. So Hamilton Jordan and Michael Johns put together a PowerPoint that they titled "Georgia's Cancer Initiative" …. and they went to see Gov. Roy Barnes.

That eventually led to a 10-year program to strengthen cancer prevention, research and treatment in our state — the Georgia Cancer Coalition. We had the honor of launching that program within GRA and later spinning it out as a freestanding organization.
The program has since run its course and met its objectives, but the story doesn't end there.

From that initiative came Georgia CORE – the nonprofit founded to increase the number of cancer clinical trials in our state.

Ten years ago, only 82 clinical trials were offered to Georgia patients who had the most common types of cancer. *Eighty-two.* And these trials were offered in just seven locations, all of them in or near Atlanta.

If you were a Georgian with cancer and wanted to enroll in a cancer clinical trial, you pretty much had to go out of state. Jordan often told the story that 80% of cancer patients at the University of Alabama - Birmingham Comprehensive Cancer Center, the closest comprehensive center to Atlanta at the time, came from area code 404.

Today, that picture is very different. Georgia CORE built a network of oncologists and healthcare providers to offer cancer clinical trials within reach of more Georgians. Right now, there are 837 actively accruing cancer clinical trials across Georgia. 64% of those trials are early phase — meaning new treatments and discoveries are being made to Georgians.

This remarkable expansion has not only improved the quality of cancer care in Georgia – it's put us on the map in clinical research.

These stories help us understand where we are today. But what do they tell us about tomorrow?

What themes or lessons can we take away to guide us in our next steps?
When I look at the past, I see three overarching elements to these stories. They are qualities or characteristics all of us should keep in mind as we make the next moves to propel Georgia to the status of a biotech capital.

The first is <u>imagination</u>. If we're going to be regarded as a 'capital' of anything, we have to think BIG.

This is what Mr. Woodruff was doing in the 1940s, when he looked at a pine forest just up the hill from where we are right now, and imagined the CDC planting its roots there.

He looked deep into the future at what such proximity would mean to Emory University and Atlanta. Today, the world's foremost public health and epidemiology operation is right here.

When we talk about imagining the future of biotech in Georgia, we should start with where we are strongest and envision it being *the best in the world.* What comes to mind? Immunotherapy research … bioengineering … carbohydrate research. It's not hard to do – we can look at citations and grant funding.

We're so strong in each of these areas. But we should ask ourselves – what's missing from them? What's keeping them from reaching the next level? What results can we expect if we were to double-down on one of them – or all of them?

The second hallmark of the defining moments in our biotech past is <u>acceptance of risk</u>.

Tom Cousins knew that increasing research capacity could do wonders for our universities, but he was no expert in complex carbohydrate science.

Neither was Fred Davison or the others who were talking to the Colorado research team about coming to Georgia.

At the time, this whole area of science was somewhat formative. But they embraced the risk. They decided to press state lawmakers to fund this new area of research.

Risk has to be managed, as it was when Rafi Ahmed was recruited here. A lot of institutions were calling on Rafi at UCLA after his 1994 breakthrough research on T-cells.

Here's how one biographer wrote about that time:

> *Little wonder colleagues and friends were surprised when Ahmed even accepted the invitation of Richard Compans to visit the Atlanta campus. They thought he had completely lost his mind when he announced he was giving up the status of UCLA for a smaller, less-recognized school that didn't even have a building for the vaccine center its leaders were talking about so grandly.*

In Emory, Rafi Ahmed saw both potential and risk – and Georgia is indeed fortunate that he was willing to make the leap.

So, what are the ideas or initiatives in our community right now that merit such acceptance of risk? What in our midst has great potential – even if it's not a perfect storm for success?

This brings us to what I see as the third characteristic of our biotech past that we can apply to the future – and that is commitment.

This may be the hardest to embrace. It's easy to stand on the sidelines, and watch and wait for something to happen. It's another thing to accept the mantle of responsibility, and *make* it happen.

We've seen this level of commitment in Tom Cousins over the years. He had a highly successful career in commercial real estate and development; he could have done like so many, and simply left charitable giving to the back nine of his life. But throughout many of the stories I shared earlier, Tom was hard at work behind the scenes.

He worked to generate funding for the Complex Carbohydrate Research Center. He was instrumental in building GRA, and served as its second chair. Tom's family foundation was a financial backer of the Clifton Corridor Partnership. Biotech in Georgia has had no greater friend or champion than Tom Cousins.

Commitment can take other forms as well. A good example is Frank McDaniel, who chairs the Bio/Med Investor Network.

Most of you are no doubt aware that a lack of venture capital is one of the greatest barriers to successfully launching new biotech companies.

This is especially true in early-stage capital – after the friends and family and angels have kicked in, but well before the larger VC firms take notice. By early-stage capital, I mean investments in the range of $50,000 to $2 million or so.

Frank has a law firm, and he tells a story about one of his biotech clients trying to raise $750,000 in early-stage capital. His client went to a funding source. They liked what they saw, so they expressed interest in providing some financing. Then they handed Frank's client an 8-page term sheet that would've required $30,000 and a stack of documents a foot tall to fulfill.

The point of the story is this: It's not just cash that's needed. Our community needs money from sources that understand early-stage biotech and life sciences.

Frank was talking with Russell Allen at Georgia Bio about this – and they decided to do something about it. In the summer of 2014, they got to work forming the Bio/Med Investor Network. GRA provided some startup funding for the network.

It's a network in the truest sense – right now, 50 members and growing. It includes disciplined, experienced investors who have successfully exited from past startup investments, and who know the world of biotech.

The Bio/Med Investor Network is helping startups get that critical stage of investment – the kind needed to develop a company and build a bridge from the angels to the big investors. That's more than just a *nice* idea – it's a *necessary* idea. But: An idea stays just that until someone steps up and says, "I'll do it."

We should ask ourselves: How can each of us step up our own commitment? To think beyond the work we do in our everyday jobs – and contribute to the longer-term goal of developing our industry?

Imagination … acceptance of risk … commitment. We need all three of these to grow biotech in Georgia. But before wrapping up, I want to talk about three other things we need:

Capital … people … and place.

The Bio/Med Investor Network is an important piece of the solution. But the larger issue of insufficient venture **capital** for biotech is a complex issue to address.

The majority of externally funded research in Georgia's university labs is in the life sciences. And two-thirds of the projects and startups that come out of these labs are in bioscience. But by and large, they're not drawing the investment interest that they merit.

Case in point: We have a unique private equity fund called the GRA Venture Fund. It was started by GRA's Board of Trustees. Like the GRA it is a public private partnership. Its investors include several dozen high net worth individuals, a number of foundations, and the state of Georgia. It's now a $45 million fund.

The purpose of the GRA Venture Fund is to help the most promising university startups attract more funding and accelerate their growth.

So far, only two of the 10 companies funded have been in biotech. They're great companies – Celtaxsys, run by Greg Duncan, and Clearside Biomedical, which has presented at this gathering in the past. But something's not right when *two-thirds* of our university startups are life science companies — yet these same kinds of companies are drawing less than *one-third* of outside venture capital investment.

We have to put our heads together to solve the VC funding bottleneck. There's no silver-bullet answer, but if we work on a strategy together, I'm confident we can make major improvements.

Related to this is **people** – and that means getting the management talent we need to run our young biotech companies. Tom O'Brien, who heads up Axion Biosystems, is a great example.

Tom was visiting from St. Louis a few years back – he was attending homecoming at Georgia Tech – when he ran into Lee Herron in the lobby of the Georgia Tech Conference Center.

As I mentioned earlier, Lee heads up our GRA Ventures program. He said to Tom, "You need to come down to Atlanta and look at some of the companies that are coming out of our universities … and pick one to run."

Tom did just that. He had some experience in the medical side of business, but not in biotech. But Tom is an astute business man. He spotted a great opportunity in Axion, which you may know makes the technology to test multiple drug compounds on human cells.

Today, Axion is becoming one of the biotech success stories in Georgia – and Tom O'Brien is a major reason why. Tom says, quote, "It's the most rewarding job of my career."

We need more Tom O'Briens in our ranks. As Tom himself points out, there are a lot of talented executives in Atlanta who may not know biotech very well, but who know how to build the infrastructure of a company.

They are the business counterbalance to the scientific and technical experts. We would do well to entice some of these people to leave their executive ranks and set off on the adventure of growing a biotech company.

Finally, there is **place**. It's well known that our state doesn't have the number of wet labs, product testing facilities and other specialized space that's essential to our industry.

In pursuing this kind of space, we should work to create a critical mass of companies and enterprises in a single location, much as they're doing at Atlanta Tech Village and Tech Square for technology companies.

This critical mass, this "sense of place," is a major reason why San Francisco and Boston and San Diego can lay claim to biotech prominence. Our neighbor to the northeast is building such a place in the Wake Forest Innovation Quarter. And our neighbor to the west is having great success with the Hudson Alpha Institute for Biotechnology in Huntsville.

It's time for to Georgia to establish such a place. All of us should work together to make sure that happens.

This morning serves as a reminder that we have a lot going for us here in Georgia.

But we have the potential to be so much more.

So let's do this. Let's pledge to continue to work together to build our future. Let's imagine together. Let's agree to take risk together. Let's commit to set ambitious but attainable goals together around people, capital and place.

If we can do this, we'll reach the day when there is no question that Georgia's place in biotech is a place of which we can all be very proud.

Thank you.